

New Species of *Malea* (Gastropoda Tonnidae) from the Pleistocene of Southern Florida

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ABSTRACT

Two new large tonnids of the genus *Malea* Valenciennes, 1832 are described from the early and middle Pleistocene of the Everglades Basin of southern Florida. These are *Malea springi* new species from the Caloosahatchee Formation (Calabrian Pleistocene) along the Miami Canal, Palm Beach County, and *Malea petiti* new species from the Bermont Formation (Aftonian Pleistocene) in extreme southwestern Palm Beach County. With a length of 189 mm (holotype), *Malea springi* is the largest of the known fossil western Atlantic *Malea* species. Due to its stratigraphic position in the middle Pleistocene Bermont Formation, *Malea petiti* may have been the last living North Atlantic *Malea* species.

INTRODUCTION

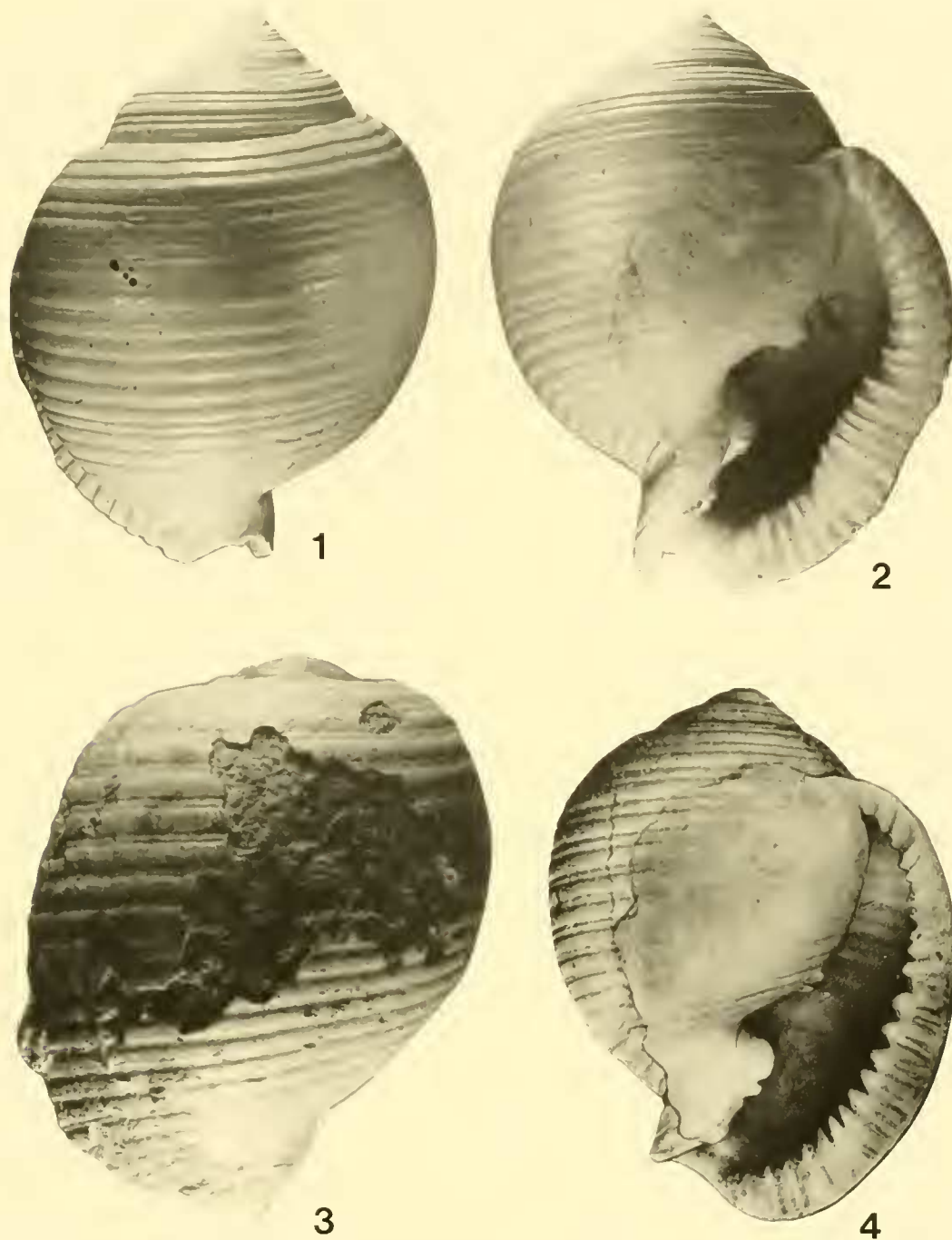
In the Neogene formations of Florida, the tonnid genus *Malea* Valenciennes, 1832 is rarely seen, with only a few complete specimens ever having been collected. The genus was unrecorded from the Floridian Peninsula until 1964, when Olsson and Petit documented the first records of *Malea* species in the Pliocene and early Pleistocene of the Everglades region. The best preserved specimens were collected in the early Pliocene (Zanclian Stage) "Pinecrest Beds" (= Buckingham Formation of Mansfield, 1939; see Petuch, 1986, 1988, for stratigraphic nomenclature and dating) from near Lake Okeechobee, and were assigned to the Pliocene Venezuelan species *Malea densecostata* (Rutsch, 1934) (figure 4). The presence of this characteristic South and Central American index fossil in Florida was used by Olsson and Petit (1964: 554) to correlate the "Pinecrest Beds" with the Punta Gavilan Formation of Venezuela.

Within the same paper (1964:553), Olsson and Petit also mention in passing the occurrence of a second, larger *Malea* species that had been found in dredgings from the early Pleistocene (Calabrian Stage) (see Petuch, 1988 for correlation and dating) Caloosahatchee Formation along the Miami Canal in the central Everglades Basin. This Pleistocene Floridian *Malea*, however, was only collected as tantalizing fragments, and could not be as-

signed to any known taxon. Olsson and Petit (1964:553) also mention the presence of poorly-preserved internal molds of a possible third Floridian *Malea* species. These were said to be exposed in the limestone of the late Pliocene (Piacenzian Stage) Tamiami Formation, presumably at the stratotype area along the Tamiami Trail in Collier County. In the subsequent literature on Floridian molluscan paleontology, however, little attention has been given to these large and stratigraphically important gastropods.

In 1981, the Miami Canal, particularly in the area just north of the levee at the Broward-Palm Beach County line, was deepened to allow better water flow during times of drought. At that time, several complete specimens of a large new *Malea* species were dredged during the canal deepening, from approximately 20 meters depth below the Everglades surface. This large, un-named tonnid was collected in an undescribed coral reef facies of the Caloosahatchee Formation, along with classic Caloosahatchee index fossils such as *Siphocypraea problematica* Heilprin, 1886, *Hystrivassum horridum* (Heilprin, 1886), and *Turbinella scolymoides* Dall, 1890. Judging from its occurrence in the Caloosahatchee Formation along the Miami Canal, the un-named *Malea* appears to represent the same species that Olsson and Petit had collected as fragmentary specimens in the 1960's. This new reef-associated Caloosahatchee species is the largest *Malea* known from North America and is one of the largest gastropods found in the Caloosahatchee Formation.

Road fill quarries in the central Everglades region, along the Palm Beach-Broward County line, have recently yielded yet another large, un-named *Malea*, in this case from the early middle Pleistocene (Aftonian Stage) Bermont Formation. Unlike the Miami Canal Caloosahatchee specimens, however, the Bermont specimens were all encased in a semifriable limestone and were only partially complete. Within this undescribed indurated member of the Bermont Formation, *Malea* specimens were collected along with classic Bermont index fossils such as *Fasciolaria okeechobeensis* Tucker and Wilson, 1932, *Melongena (Rexmela) bispinosa* (Philippi, 1844), *Vasum floridanum* McGinty, 1940, *Lindoliva*



Figures 1-4. Fossil *Malea* species from the Pliocene and Pleistocene of southern Florida. **1, 2.** *Malea springi* new species, dorsal and ventral views of holotype, length 189 mm, Caloosahatchee Formation, Calabrian Pleistocene, UF 21455. **3.** *Malea petiti* new species, dorsal view of holotype, length (incomplete) 130 mm, Bermont Formation, Aftonian Pleistocene, UF 21456. **4.** *Malea densecostata* (Rutsch, 1934), ventral view of 109 mm specimen, Buckingham Formation (= Pinecrest Beds) at Indian Prairie Levee, Zanclean Pliocene. Taken from Olsson and Petit (1964, pl. 79, fig. 5).

spengleri Petuch, 1988, and *Strombus* (*Eustrombus*) *mayacensis* Tucker and Wilson, 1933. Fragmentary specimens of this large Bermont *Malea* were also collected at a quarry west of Miami, in Dade County, along with the same molluscan assemblage as that found in the central Everglades rock pits.

In this paper, two new Floridian fossil *Malea* species are described; *Malea petiti* n.sp. from the Bermont Formation and *Malea springi* n.sp. from the Caloosahatchee Formation. These species, along with the Buckingham *Malea densecostata* and the un-named, moldic Tamiami species, show that four different species of *Malea* oc-

curred in southern Florida during Plio-Pleistocene time. The relationship of the new taxa to other Plio-Pleistocene *Malea* species from elsewhere in the western Atlantic are discussed under the respective descriptions. Institutional abbreviations, for the deposition of type material, include: UF (Florida Museum of Natural History, University of Florida, Gainesville, Florida), ANSP (Paleontology collection, Department of Malacology, Academy of Natural Sciences of Philadelphia), and FAU (Paleontology collection, Department of Geology, Florida Atlantic University, Boca Raton, Florida).

SYSTEMATICS

Gastropoda
Prosobranchia
Tonnacea
Tonnidae
Tonninae

Malea Valenciennes, 1832

Malea petiti new species
(figure 3)

Material examined: HOLOTYPE—Length (incomplete) 130 mm, width 98 mm, dredged from approximately 17 m depth in Griffin Brothers road fill pit, 11 km due west of US Highway 27, on Broward County-Palm Beach County line, Florida, lower member of the Bermont Formation, Aftonian Pleistocene, UF 21456; PARATYPES—fragment, length 89 mm, dredged from 20 m depth in Capeletti Brothers pit mine #11, 7 km west of Florida Turnpike, northeastern Dade County, Florida, Bermont Formation, UF 23800; length 56 mm (mold of juvenile), from same locality and depth as holotype, FAU 414.

Description: Shell inflated, subcylindrical, very thin and fragile; sides of body whorl only slightly rounded, giving shell barrel-shaped appearance; shoulder slightly angled, producing flattened subsutural area; spire (of juvenile mold) low, flattened; body whorl (of holotype) ornamented with 22 wide, very flattened ribs; thin, flattened secondary rib present between each pair of wide primary ribs; secondary ribs widest and best developed on posterior half of body whorl, becoming thinner and almost obsolete on anterior half; siphonal canal proportionally small, recurved; because of fragmentary nature of type material, shape and form of outer lip, aperture, parietal shield, and columellar region unknown.

Stratigraphic range: Known only from the lower beds (un-named member?) of the Bermont Formation in the Everglades Basin, Aftonian Stage of the Pleistocene.

Etymology: Named for Mr. Richard E. Petit, of North Myrtle Beach, South Carolina, who, along with the late Dr. A. A. Olsson, documented the first records of *Malea* from southern Florida.

Discussion: Although similar in size to the Caloosahatchee *Malea springi*, *M. petiti* differs in being a more

cylindrical shell with straighter sides, and in having a distinctly lower spire and flatter subsutural area above the shoulder. The form of the ribs and rib count also differ between the two species; those of *M. petiti* are wider and less numerous (22 on the holotype), while those of *M. springi* are narrower and more numerous (26 on the holotype). Based on its overall similarity to the older *M. springi*, *M. petiti* is most probably the direct descendant of the finer-ribbed Caloosahatchee species. Taking into account the geologically young age and high stratigraphic position of *M. petiti*, this new species may have been the last-living *Malea* s.s. in North America.

Malea springi new species
(figures 1, 2)

Material examined: HOLOTYPE—Length 189 mm, width 130 mm, dredged from 20 m depth along the Miami Canal, due west of the Talisman Sugar Refinery, 10 km north of the Broward-Palm Beach Levee, southwestern Palm Beach County, Florida, uppermost beds (Ayers Landing Member?) of the Caloosahatchee Formation, Calabrian Pleistocene, UF 21455; PARATYPES—length 178 mm, from same depth and locality as holotype, ANSP 1133; length 170 mm, from same depth and locality as holotype, Spring collection, Stuart, Florida; length 156 mm, from same depth and locality as holotype, collection of author.

Description: Shell inflated, globose, thick and heavy; sides of body whorl distinctly rounded; shoulder and subsutural area rounded; spire whorls elevated, slightly protracted; suture impressed, minutely canaliculate; body whorl ornamented with 26 (on holotype) thin, flattened ribs; small, very thin secondary ribs sometimes present between large primary ribs, especially in midbody region; siphonal canal proportionally well-developed, recurved; parietal region overlaid by wide, thick, smooth shield; columellar notch proportionally large, well-developed, "U"-shaped, deep; edges of notch bordered by large knobby bosses, one on either side, that project into aperture; outer lip very thickened, wide, with 23 (on holotype) thin, elongated denticles along facing edge; medial portion of inner edge of lip wider than rest of lip, projecting into aperture; projecting bosses on either side of columellar notch and wide medial area of lip produce slightly sigmoidal shape within aperture.

Etymology: Named for Mr. Keith Spring, marine biologist at Continental Shelf, Inc., Tequesta, Florida, who collected the holotype along the Miami Canal.

Discussion: *Malea springi* is most similar to the ancestral Pliocene *M. densecostata*, but differs in being a much larger, more inflated shell with a higher, more protracted spire, and in having finer and more numerous ribs. The columellar notch of *M. springi* is proportionally larger than that of *M. densecostata*, being more indented and wider. The knobby bosses on either side of the columellar notch of *M. springi* are also larger and more developed than those of *M. densecostata*, and extend farther into

the aperture. The shape of the inner edge of the lip also differs between the two species; with the edge being rounded and arcuate in *M. densecostata*, but subarcuate in *M. springi*, being slightly deformed by the wider medial area that projects inwardly, into the aperture.

The new Caloosahatchee *Malea* also resembles the well known *M. camura* Guppy, 1866, from the late Miocene-Pliocene of the Caribbean Basin (the Bowden Formation of Jamaica, the Gatun Formation of Panama and Costa Rica, and the Cercado and Gurabo Formations of the Dominican Republic), but differs in being a much larger and more inflated shell with more numerous and thinner ribs, and in having a much wider and better developed columellar notch. The 35.8 mm specimen of *M. camura* illustrated by Woodring (1928: pl. 20, figs. 7, 8) is typical of the species, and can be used for comparison with *M. springi*.

Malea springi also resembles *M. mareana* Weisbord, 1962 from the late Pliocene (early Pleistocene?) Mare Formation of Venezuela (Weisbord, 1962). Although similar to *M. springi* in shape and in having an elevated spire, the possibly-contemporaneous *M. mareana* differs in being a much smaller shell (holotype 47 mm), and in having a proportionally smaller and narrower columellar notch. The type of *M. mareana* (illustrated by Weisbord, 1962, pl. 24, figs. 1, 2) also has a sharply-angled, sub-earinated shoulder, a feature that is missing in the distinctly round-shouldered *M. springi*.

At 189 mm length, the holotype of *Malea springi* is the largest specimen of any of the known western Atlantic *Malea* species. Previously, this title was held by a specimen of *M. goliath* Pilsbry and Johnson, 1917 from the Gurabo (Cercado?) Formation of the Dominican Republic, which reached a length of 129 mm (holotype). This was followed by the Floridian specimen of *M. densecostata* illustrated by Olsson and Petit (1964), with a

length of 109 mm. The Bermont *M. petiti*, with an incomplete holotype of 130 mm, and the Caloosahatchee *M. springi*, then, together probably represent the greatest development in shell size in the fossil American *Malea* species. The "*Malea* sp." that I illustrated previously (Petuch, 1988, pl. 22, figs. 5, 6) is *M. springi*.

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